

@IWGGMS, 14 Jul 202, Online

presented by Prabir Patra



REgional Carbon Cycle Assessment and Processes – 2 (RECCAP2)

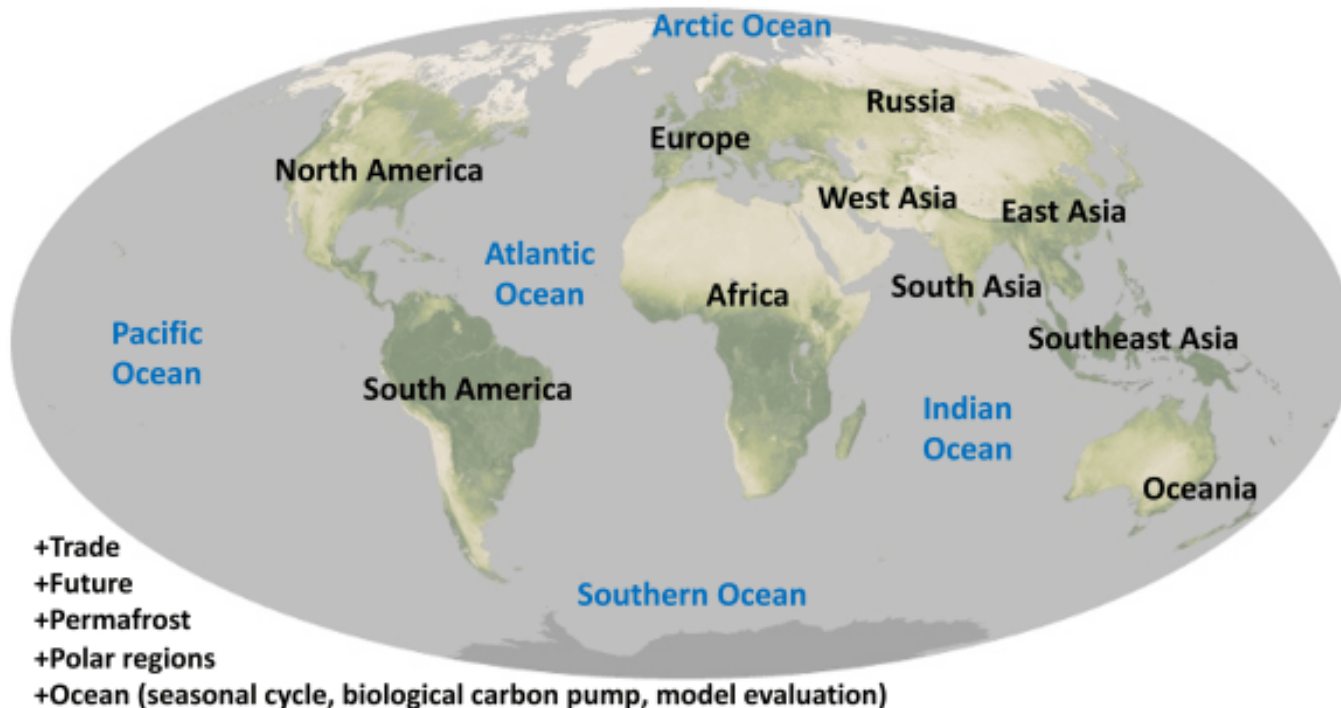


Inventorying Earth's Land and Ocean Greenhouse Gases

A new special collection in AGU journals will present findings from the Second REgional Carbon Cycle Assessment and Processes (RECCAP2) study with a decade of data on greenhouse gas growth.

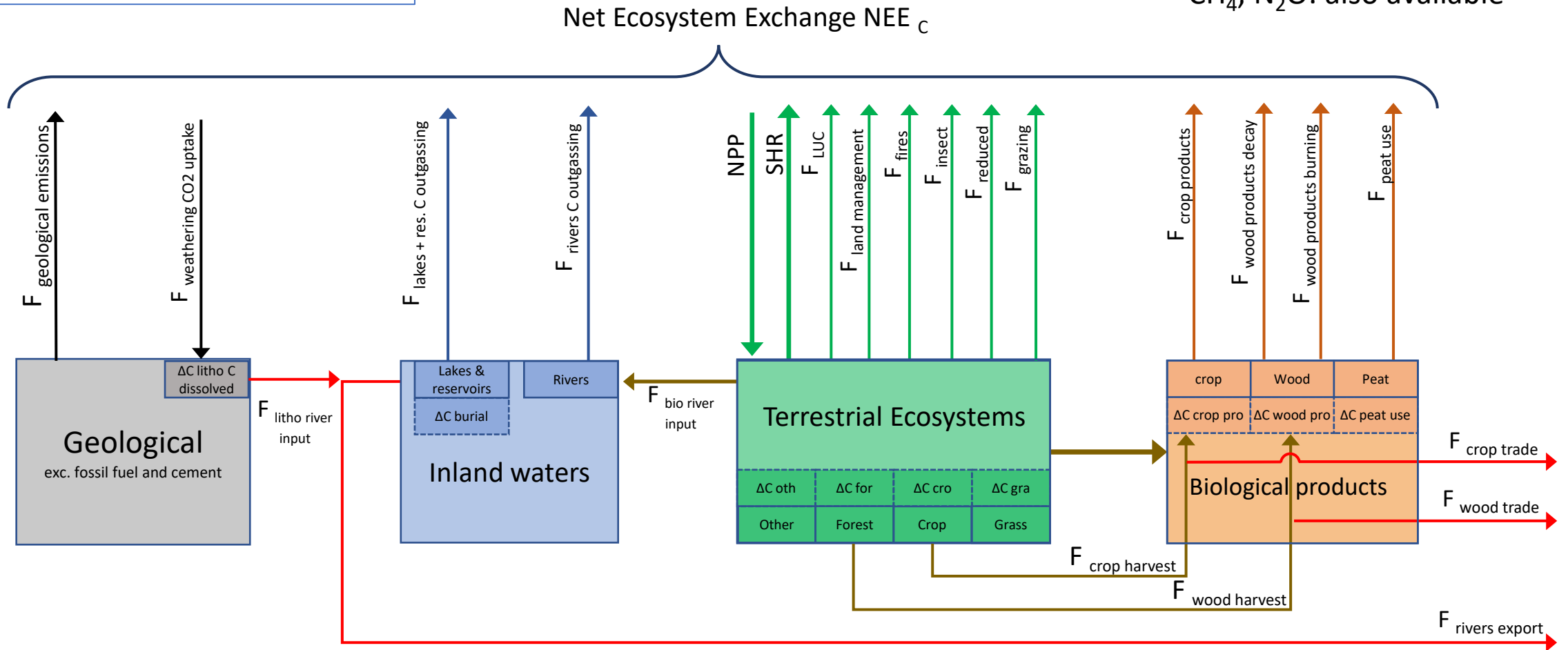
by Benjamin Poulter, Ana Bastos, Josep G. Canadell, Philippe Ciais, Nicolas Gruber, Judith Hauck, Robert B. Jackson, Masao Ishii, Jens Daniel Müller, Prabir K. Patra and Hanqin Tian

and Hanqin Tian
17 February 2022



Carbon budeting framework

CO₂: Ciais et al., 2022
CH₄, N₂O: also available

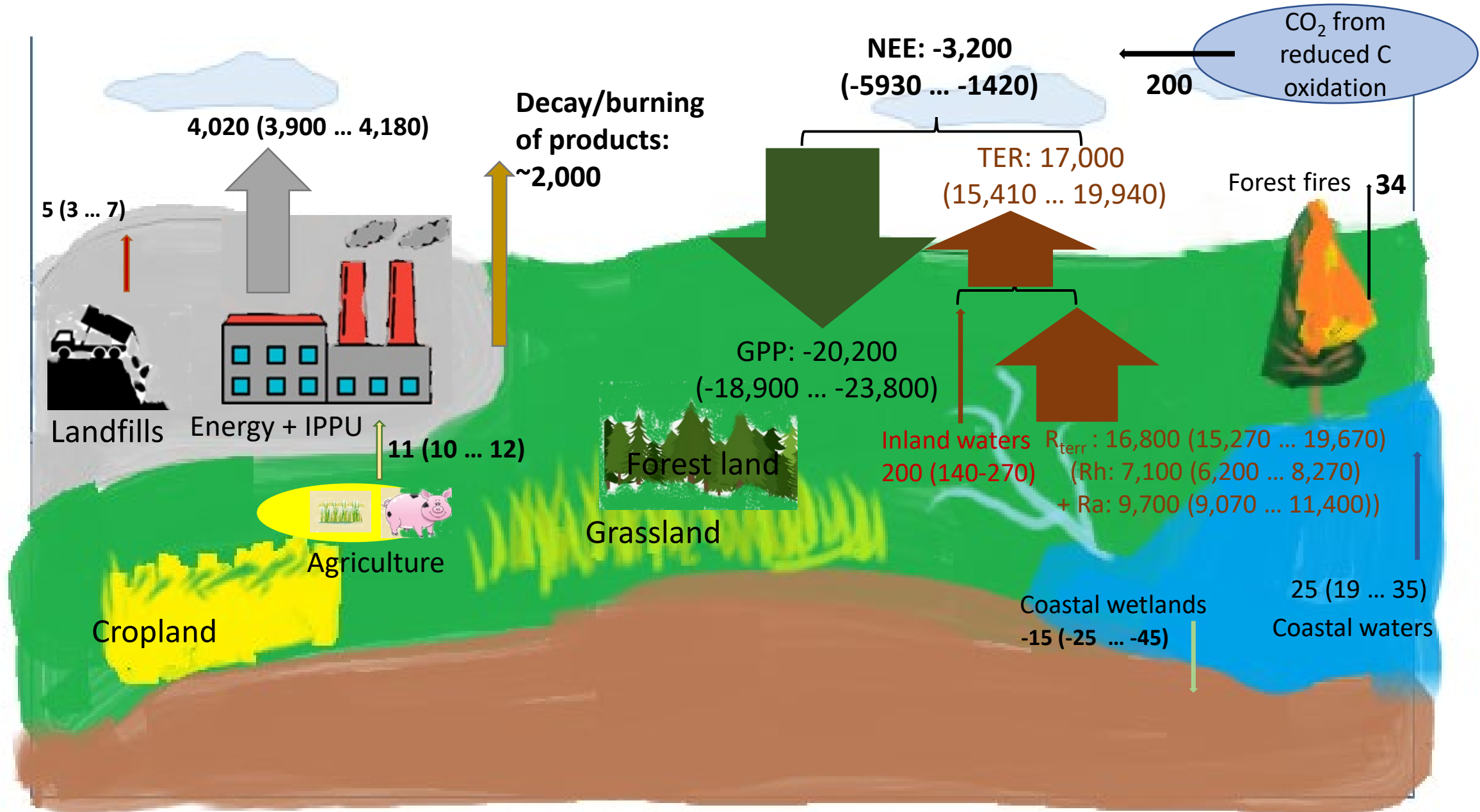


$F_{\text{geological emissions}}$ = Geological natural emissions
 $F_{\text{weathering CO}_2 \text{ uptake}}$ = Weathering CO₂ uptake
 $F_{\text{lakes + res. C outgassing}}$ = Lakes & reservoirs C outgas
 $F_{\text{rivers C outgassing}}$ = River C outgassing

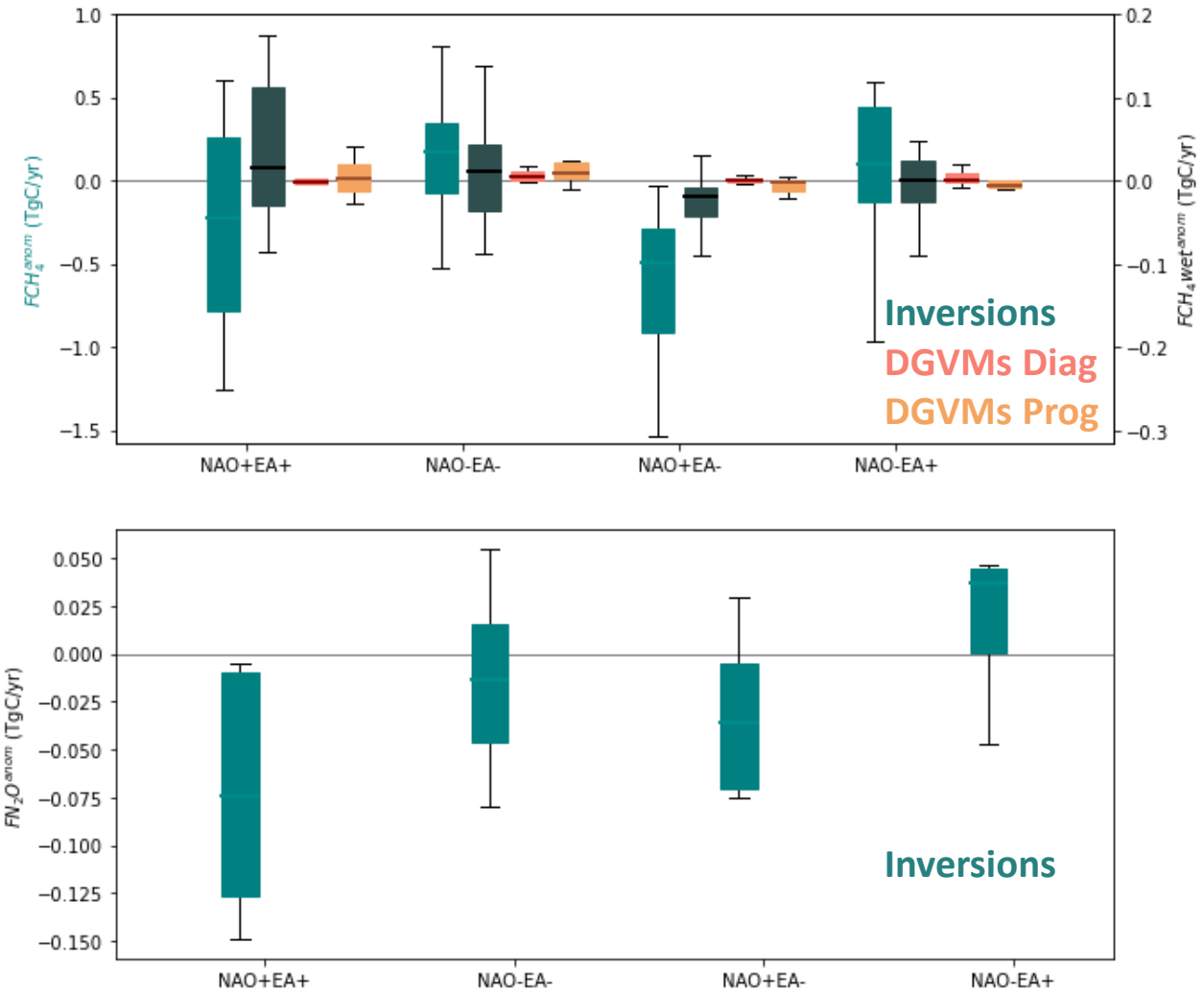
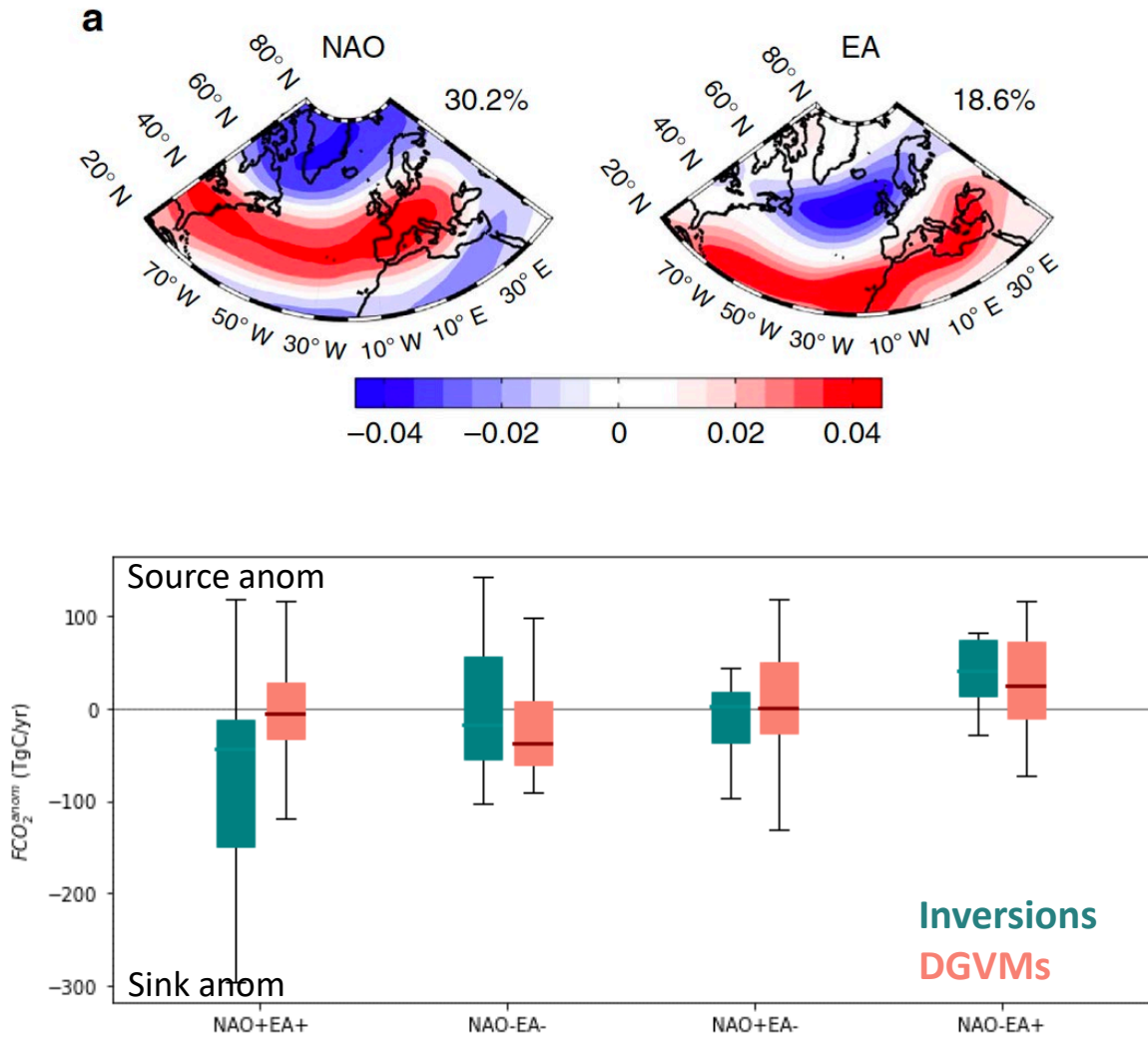
NPP = Net Primary Production
 SHR = Soil Heterotrophic Respiration
 F_{LUC} = Net Land Use Change flux
 $F_{\text{land management}}$ = Net land management flux
 F_{fires} = Fires total C emissions
 F_{insect} = Grazing & disturbance C emissions
 F_{reduced} = Reduced C compounds emissions
 F_{grazing} = C emissions from grazing mammals

$F_{\text{crop products}}$ = Crop products oxidation C emissions
 $F_{\text{wood products decay}}$ = Wood products oxidation C emissions
 $F_{\text{wood products burning}}$ = Wood products burning C emissions
 $F_{\text{peat use}}$ = Peat extraction
 $F_{\text{crop trade}}$ = Crop trade lateral C flux
 $F_{\text{wood trade}}$ = Wood trade lateral C flux
 $F_{\text{rivers export}}$ = River C export to estuaries

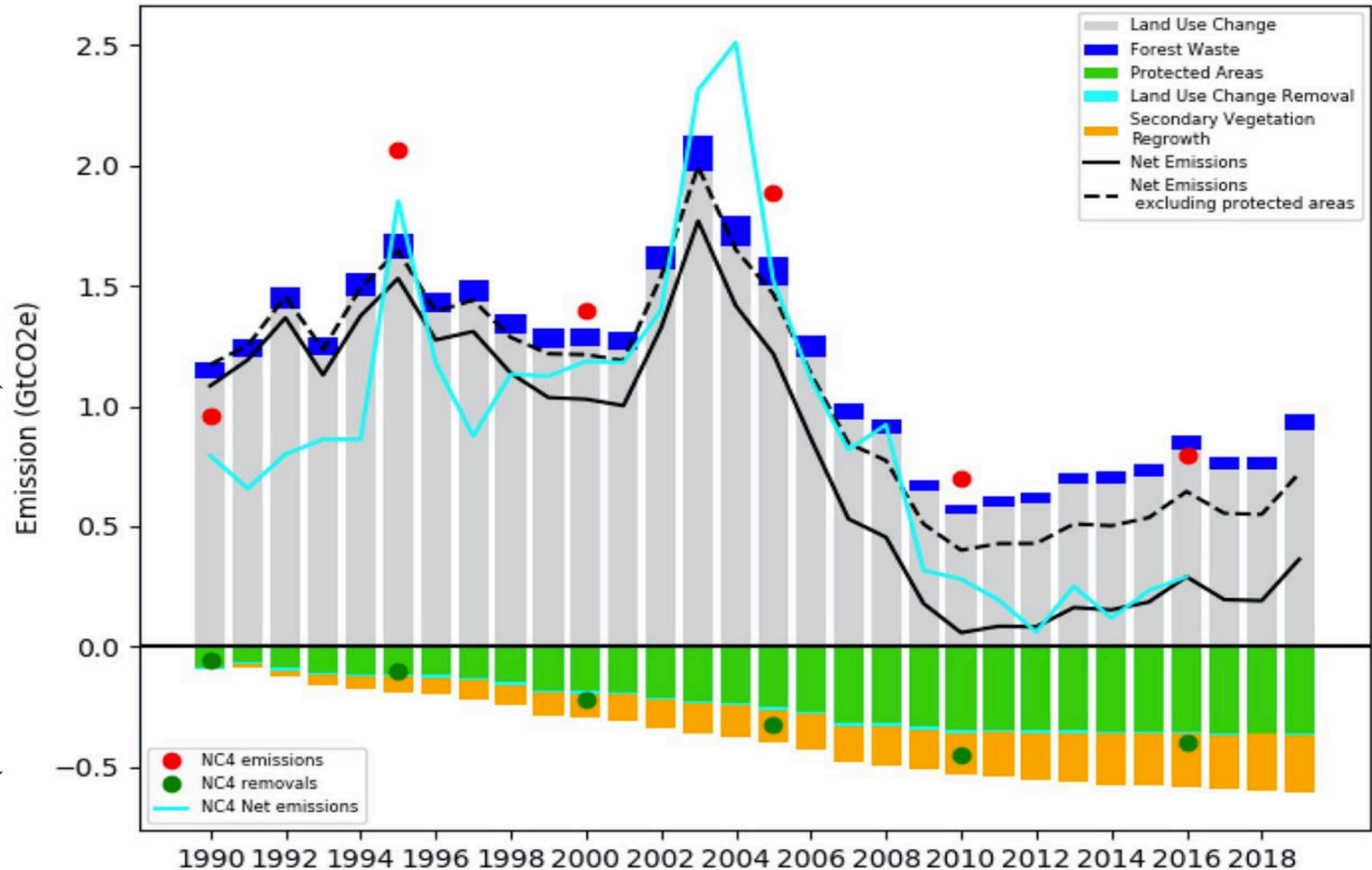
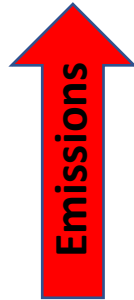
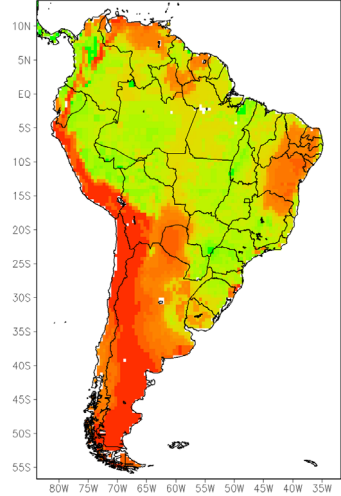
GHG budgets 2010-2019: European CO₂ budget (Tg CO₂ yr⁻¹)



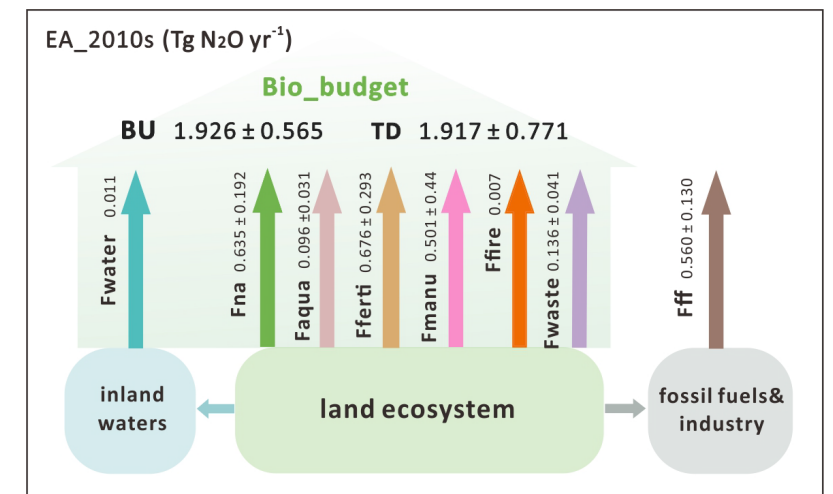
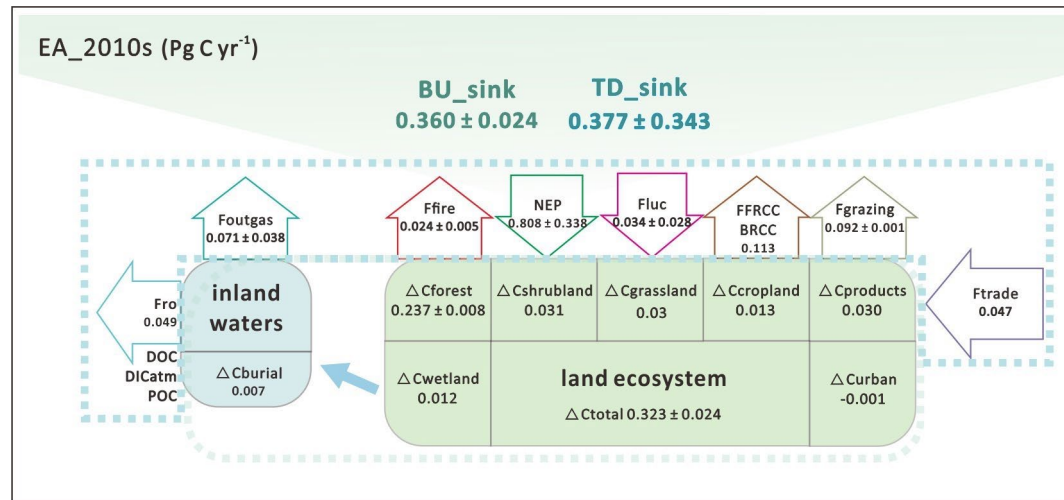
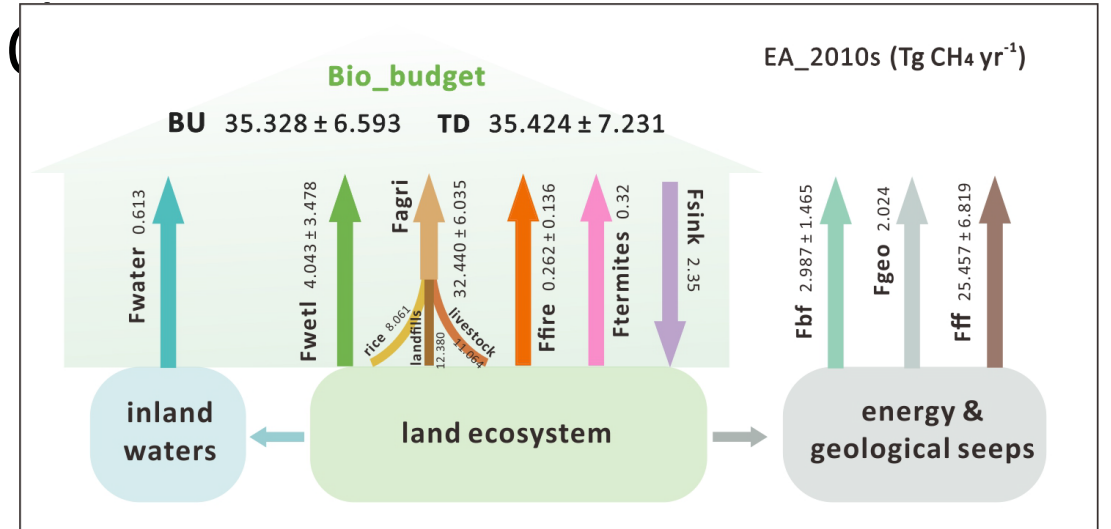
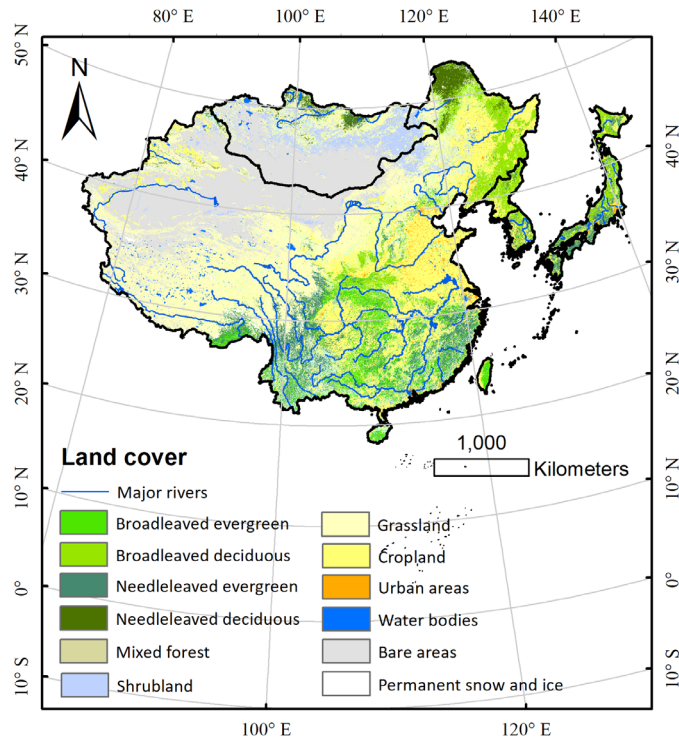
IAV and climatic drivers



South America: Brazilian emissions are dominated by deforestation

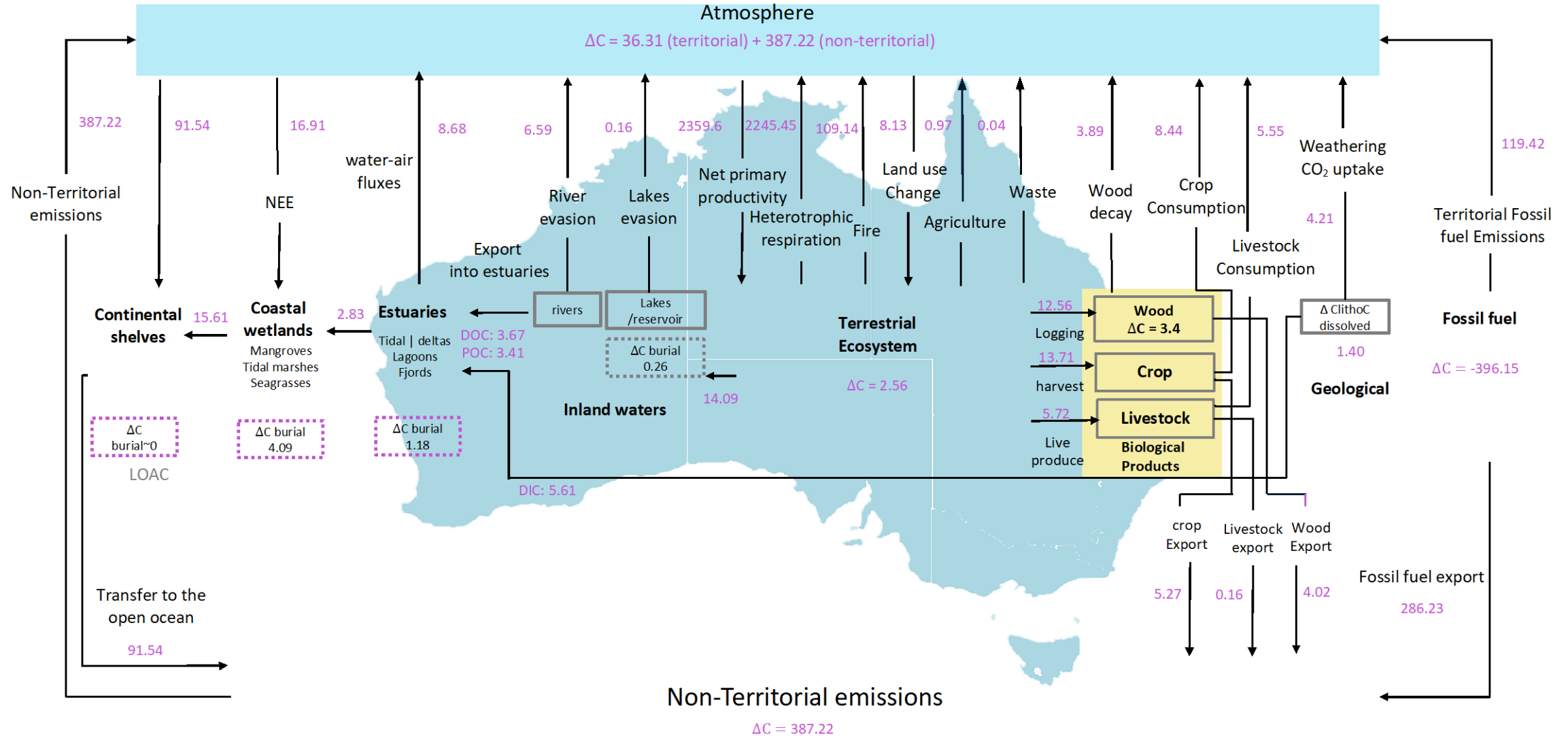


GHG balance of terrestrial ecosystems in East Asia during 2000s and



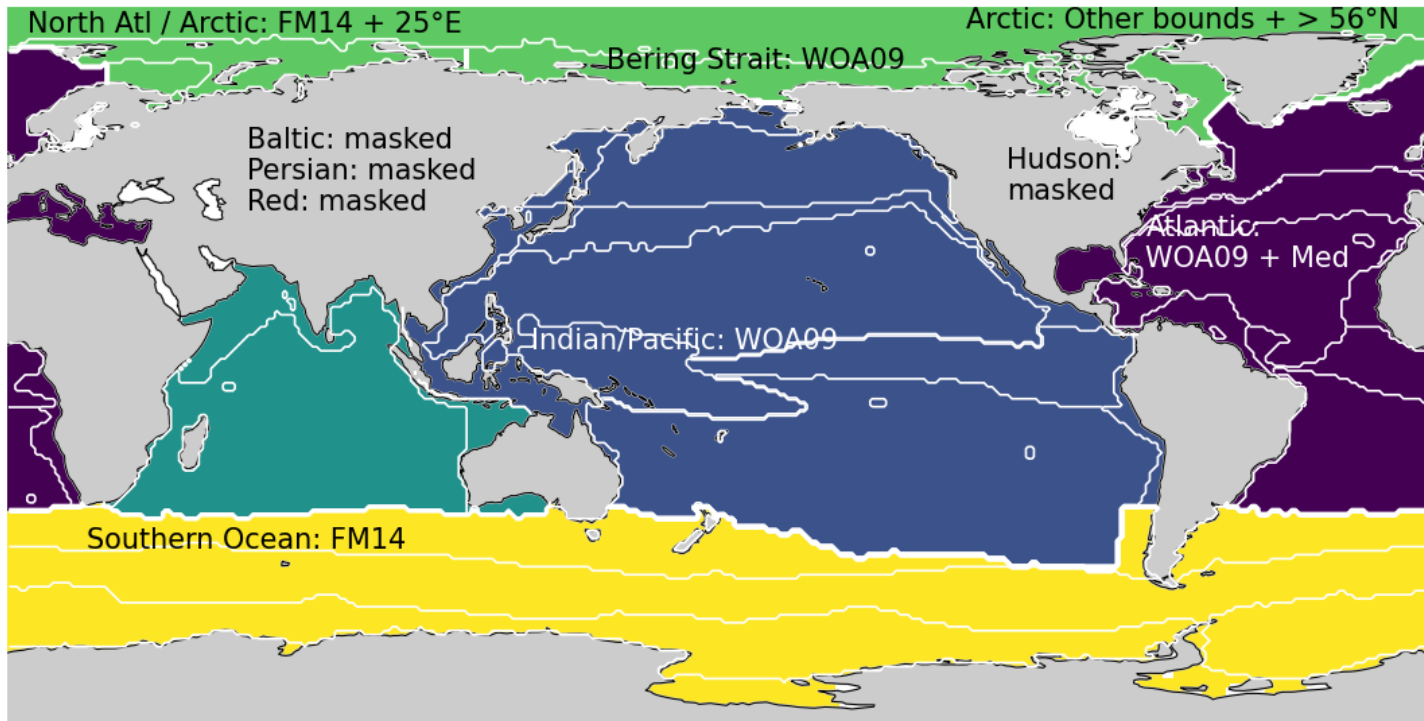
Australasia carbon Budget bottom up approach (2010-2019)

Most closely follow
Ciais et al. ?



Further understanding?

REgional Carbon Cycle Assessment and Processes 2 (RECCAP2 ocean)



3 global chapters
global, seasonal cycle,
biological carbon pump

plus 5 regional chapters
Atlantic, Pacific, Indian Ocean,
Arctic, Southern Ocean



Conclusions – Southern Ocean (example)

A **multitude** of models and data-products **available**

We reach **consensus on the mean flux** – caveats: (1) most models underestimate anthropogenic carbon storage, (2) uncertainty of river flux adjustment

Discrepancies remain on the **change of flux since around 2000**, caveats: (1) models underestimate C_{ant} uptake, (2) data-product(s) overestimate variability

Summer fluxes need as much attention as winter fluxes (balance between physical and biological processes)

Collaborative effort – **big thanks** to data wizards Cara Nissen, Luke Gregor, Lavinia Patara, Mark Hague, Precious Mongwe, Seth Bushinsky and all contributors and organizers of RECCAP

Thank you